REMARKS

Upon entry of the present amendment, claims 1-7 and 9-24, and new claims 25-34 are pending in the application.

1. **Rejection of Claims 1-3, 9, 10 and 21 under 35 U.S.C. § 103(a) as being unpatentable over Becker et al., US 2002/0006368, hereafter "Becker", in view of Zhou, US 6,500,969, hereafter "Zhou" and Li et al. US 6,782,892, hereafter "Li."**

Applicants greatly appreciate the detailed basis of rejection but must respectfully continue to disagree.

The outstanding office action acknowledges that Becker fails to teach a plurality of catalysts as being nanoparticles as required by Applicants' amended independent claims 1 and 21. In the outstanding office action, Zhou and Li are used to rectify the deficiencies of Becker. In particular, the PTO states that the combination of Becker and Zhou, i.e., 'modified Becker', "...teaches nano-sized oxidation catalyst in the range of 0.5 to 100 nm (see Zhou, claim 15), but is silent on particle size in the range of 15-23 nm." (Office Action of 7/31/07, page 3.) Li is relied upon by the PTO to correct this deficiency.

However, it is respectfully requested that the invention of amended claim 1 cannot be rendered prima facie obvious by either the combination of Becker and Zhou or Becker, Zhou and Li.

For example, Applicants' amended claim 1 now positively recites the fluidization of the nanoparticles by the fluidizing material. This required limitation of Applicants' claimed invention may therefore not be ignored. Moreover, Applicants further note the exisiting limitation of the method of independent claim 21:

> introducing the fluidizing material into the chamber and directing the fluidizing material at the lower surface to fluidize at least a portion of the catalyst nanoparticles located on the surface to create a gaseous dispersion of catalyst nanoparticles

which may likewise not be ignored.

Thus, both the apparatus and method of independent claims 1 and 21 contain elements that require at least a portion of the nanoparticles located on the lower surface of the chamber to be fluidized by the introduced fluidizing material. These limitations

may not be ignored. All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

In this case, the cited combination of Becker and Zhou fails to result in Applicants' claimed invention. Indeed, as will be shown below, the express teachings of the two claimed invention contradict each other and cannot be combined.

For example, Zhou does not teach the fluidizing of nanoparticles and the creation of a gaseous dispersion. Thus, Zhou does not and cannot teach the use of fluidized nanoparticles that react with a contaminated gas to produce a decontaminated gas

Rather, Zhou teaches a process for producing organic chemicals by selective oxidation ('969, col. 1, lines 12-13). Zhou accomplishes this goal by disclosing a chemical oxidation process based on hydrogen peroxide, wherein the hydrogen peroxide is the oxidizing agent.

Zhou's hydrogen peroxide is generated by a noble metal catalyzed reaction of hydrogen and oxygen, and further wherein the noble metal catalysts are nanopaticles ('969, col. 2, lines 26-27, 40-42 and col. 3, lines 60-64). More specifically, Zhou teaches using the noble metal catalyst nanoparticles to convert hydrogen and oxygen into hydrogen peroxide. Thus, Zhou does not and cannot teach the oxidation reaction between the contaminated gas and the catalyst nanoparticles as is required by Applicants' invention. Instead, hydrogen peroxide is the oxidizing agent of Zhou's process. The hydrogen peroxide may be produced in situ or in the first stage of a two-stage process, wherein oxidation of an organic chemical feedstock is the second stage ('969, col. 4, lines 41-67 and col. 5, lines 1-20). In both the in situ or two-stage mode of the Zhou process, the oxidation of the organic chemical feedstock may or may not be catalyzed by a second catalyst comprising an oxidation catalyst selective for organic chemicals ('969, col. 4, lines 51-54 and col.7, lines 28-30).

In Zhou, catalyst nanoparticles are not taught to catalyze the oxidation of the organic chemicals ('969, col. 7, lines 35-55). The primary attribute of the catalyst nanoparticles in Zhou are their "capability to catalyze the direct formation of hydrogen peroxide from hydrogen and oxygen feedstreams with high selectivity, even at low, safe hydrogen concentrations." ('969, col. 6, lines 39-43). Zhou does not teach anything else with regard to the use of catalyst nanoparticles. The mere fact that references can

be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990).

In addition, the Zhou reference teaches away from using from the oxidizing agents disclosed in Becker and the two references cannot be combined. Becker provides that suitable oxidizing agents include air, oxygen-enriched air and oxygen gas with minor amounts of impurities such as nitrogen, carbon dioxide, and argon ('368, [0024]). In contrast, Zhou teaches away from the above mentioned oxidizing agents stating that such oxidizing agents are expensive, dangerous, and suffer from product selectivity problems ('969, col. 1, lines 43-59). As an attractive alternative, Zhou teaches the use of peroxide compounds to provide hydrogen peroxide as an alternative. ('969, col. 1, lines 60-63). Zhou does not teach that his catalyst nanoparticles can replace Becker's oxidizing agents. Rather, it is the stated purpose of Zhou to replace the oxidizing agents of Becker with hydrogen peroxide.

Applicants are therefore unclear as to how these two references can be combined to provide a 'modified Becker'. For example, the combination of the Becker and Zhou appears to violate the basic principle of operation set forth in Zhou. Replacing Becker's oxidizing agents with Zhou's catalyst nanoparticles that only make hydrogen peroxide would appear to result in an inoperative embodiment at the least. Clarification is respectfully requested. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. *In re Ratti*, 123 U.S.P.Q. 349 (CCPA 1959); MPEP 2143.01. Applicants' respectfully request clarification as to how *In re Ratti* is not dispositive in the instant fact pattern.

Furthermore, Applicants are unclear as to *how* or *why* hydrogen peroxide *could/would* be fluidized in their apparatus of claim 1 or utilized in the method of claim 21 or even in the fluidized reactor of Becker. That is, the PTO's combination of Becker and Zhou appears to be inoperative. If proposed modifications would render the prior art invention being modified unsatisfactorily for its intended purpose, then there is no

suggestion or motivation to make the proposed modification. In re Gorden, 221 U.P.S.Q. 1125 (Fed. Cir. 1984); MPEP 2143.01.

Finally, Li fails to recitify any of the above noted deficiencies of Becker and Zhou in regard to the apparatus of amended independent claim 1 and the method of independent claim 21. Indeed, as noted above, both claim 1 and claim 21 require the fluidization of the catalyst nanoparticles. It is assumed that the PTO means to replace the catalyst nanoparticles of Zhou with the catalyst nanoparticles of Li and then to replace Becker's oxidizing agents with the hydrogen peroxide producing catalyst nanoparticles of Zhou. However, since Li's catalyst nanoparticles are contained in solid cigarette, it is unclear how they would be able to be fluidized. That is, any nanoparticles capable of fluidization would be unsuitable in a cigarette filter. Most importantly, it is noted that the catalyst nanoparticles require the absence of oxygen in at least a portion of the cigarette to perform their necessary oxidative function. (See '892, col. 7, lines 6-7) Once again, it is submitted that the combination of the cited references fails to provide any workable apparatus, let alone the Applicants' claimed apparatus or method.

Thus, the cited combination of the three references fails to teach or disclose all of the required limitations of the apparatus of Applicants' claim 1 or the method of Applicants' claim 21. Reconsideration and removal is respectfully requested.

2. Rejection of Claims 4, 5, 7, 22, 23 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Becker and Zhou and further in view of Alford et al. US 6,887,291, hereafter "Alford", and Ballantine et al. US 2006/0078771, hereafter "Ballantine."

Claims 4, 5, 7, and 22-24 stand rejected as obvious over the combination of Becker in view of Zhou and in further view of Alford.

The outstanding office action acknowledges that Becker, as modified by Zhou, fails to disclose (1) a second input for introducing a backpressure pulse of gaseous material; (2) a gas permeable separation device in communication with both a port and the second input, wherein the exit of gas from a hollow interior region through the gas permeable separation device causes catalyst nanoparticles to collect upon the gas permeable separation device and the entrance of the backpressure pulse into the

hollow interior region displaces collected catalyst nanoparticles; and (3) synchronizing the introduction of at least one of the group consisting of backpressure pulse, contaminated gas, or fluidizing material.

Alford is relied upon to rectify the deficiencies of Becker as modified by Zhou. In particular, the office action states:

> Alford also discloses a filter device for removing nanoparticles from gas streams using a gas permeable separating device (Fig. 1(2), see Abstract).
>
> Alford teaches a second input (5) for introducing a backpressure pulse (pulse jet) of gaseous material into a hollow interior region (10) (col. 7 lines 59-67) in order to clean a filter (col. 7 lines 43-55).
> It would have been obvious to one of ordinary skill in the art at the time of the invention to use the backpressure pulse input of Alford with the fluidized bed oxidation reactor with nanoparticles of the modified Becker in order to clean the filter that is used to separate the nanopaticles from the gas stream with the second input…
>
> Alford teaches a gas permeable separation device (filter, 2) in communication with a hollow interior region (10) and the second input (5) and the entrance for introducing a backpressure pulse (pulse jet) into the hollow interior region (10) displacing collected catalyst nanoparticles (col. 7 lines 43-55). Alford teaches this in order to allow catalyst nanoparticles to be collected by said gas permeable separation device (filter) and to clean said gas permeable separation device of said catalyst nanoparticles (col. 7 lines 35-67).
>
> It would have been obvious to one of ordinary skill in the art at the time of the invention to use the gas permeable separation device (in communication with the second input) and the entrance of the backpressure pulse into the hollow interior region to displace the collected nanoparticles of Alford, with the fluidized bed oxidation reactor of the modified Becker in order to allow catalyst nanoparticles to be collected by said gas permeable separation device and to clean said gas permeable separation device of said catalyst nanoparticles…
>
> Alford teaches the introduction of the backpressure pulses to be synchronized with the rise in pressure in order to clean the filter before vessel pressure becomes to high (col. 6 lines 2-5). Alford also teaches that the backpressure pulses will be alternating on and off during the operation to create gas pulses and form a shockwave that vibrates and dislodges the material collected on the filter (col. 8 lines 1-6).
>
> (Office Action of 3/23/07).

Applicants greatly appreciate the detailed basis of rejection but must respectfully disagree.

The foregoing remarks for Section 1 are incorporated herein by reference. As merely cited for disclosing 1) a second input for introducing a backpressure pulse of gaseous material; (2) a gas permeable separation device in communication with both a port and the second input, wherein the exit of gas from a hollow interior region through the gas permeable separation device causes catalyst nanoparticles to collect upon the gas permeable separation device and the entrance of the backpressure pulse into the hollow interior region displaces collected catalyst nanoparticles; and (3) synchronizing the introduction of at least one of the group consisting of backpressure pulse, contaminated gas, or fluidizing material, nothing in Alford rectifies the deficiencies of Becker, Zhou and Li, as discussed above with respect to independent claims 1 and 21.

Since claims 4, 5, 7, and 22-24 respectively depend from independent claims 1 and 21, they necessarily incorporate all of the limitations thereof. As a result, it is submitted that these dependent claims are likewise nonobvious for the reasons discussed above in Section 3.

Moreover, Alford fails to teach a device for synchronizing the function of the second input for introducing a backpressure pulse of gaseous material into the hollow interior region to function with at least one of the group comprising the first input for introducing a contaminated gas into the hollow interior region, the fluidizing input for introducing a fluidizing material into the hollow interior region and combinations thereof, wherein the device for synchronizing prevents the simultaneous introduction of at least one of the group comprising contaminated gas, fluidizing material, and combinations thereof with a backpressure pulse of gaseous material into the hollow interior region.

Alford teaches filter devices and methods for collection of carbon nanomaterials produced in gas phase reactors ('291, Abstract). Alford accomplishes this goal by disclosing filters cleaned by a reverse flow of gas pulses to said filter ('291, Abstract). The gas pulses "may be activated periodically at selected intervals during rector operation or may be activated responsive to a system parameter such as reaching a maximum pressure within the reactor." ('291, col. 6, lines 2-5).

Although Alford discloses periodic activation of gas pulses, it is completely silent as to a device that synchronizes the introduction of the gas pulse with the introduction of one or more other gases into the hollow interior region. Nothing in Alford teaches or suggests introducing the back pressure gas pulse back into the hollow interior region, nor a device that synchronizes the introduction of the gas pulse with the introduction of one or more other gases into the hollow interior region.

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 180 USPQ 580 (C.C.P.A. 1974); MPEP 1243.03. Since Alford fails to disclose even these additional requirements of the inventions of these dependent claims, reconsideration and removal of the rejection is respectfully requested.

3. Rejection of Claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Becker and Zhou and further in view of Goswami US 5,933,702, hereafter "Goswami."

Claim 6 stands rejected as obvious over the combination of Becker in view of Zhou and in further view of Goswami.

The outstanding office action acknowledges that Becker, as modified by Zhou, fails to expressly teach a humidifier in communication with the first input. Goswami is relied upon to rectify this deficiency of Becker as modified by Zhou. In particular, the outstanding office action states:

> Goswami also discloses a photocatalytic/oxidation reactor for reacting a gas to remove contaminants via oxidation.
>
> Goswami discloses a humidifier (Fig. 1(50)) on the gas inlet (18) to a photocatalytic/oxidation reactor (21) in order to provide the correct relative humidity for the complete oxidation and destruction of a microorganism in the photocatalytic/oxidation reactor (col. 7 line 60 - col. 8 line 4).
>
> It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the humidifier and photocatalytic/oxidation reactor of Goswami with the fluidized bed oxidation reactor of Becker in order to ensure the correct humidity for the complete oxidation and destruction of said microorganisms.

(Office Action of 3-23-07, pages 10 and 14).

Applicants greatly appreciate the detailed basis of rejection but must respectfully disagree.

The foregoing remarks of Section 1 are incorporated herein by reference. As Goswami has merely been cited for disclosing a humidifier in communication with a gas inlet, nothing in Goswami rectifies the deficiencies in the combination of Becker and Zhou, as discussed above in Section 3 with respect to independent claim 1. Since dependent claim 6 incorporates all of the limitations of claim 1, it is likewise submitted to be nonobvious over the cited combination of references for at least the reasons discussed above.

Reconsideration and removal of the rejection is respectfully requested.

4. Rejection of Claims 11 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Becker and Zhou and further in view of Wu (US 2002/0187082).

The foregoing remarks of Section 1 are incorporated herein by reference. Wu fails to rectify the deficiencies of Becker as modified by Zhou with respect to independent claim 1. Since claims 11 and 12 depend from claim 1, they necessarily incorporate all of the limitations of claim 1 and are likewise nonobvious with regard to the cited combination of Becker and Zhou.

Reconsideration and removal of the rejection is respectfully requested.

5. Rejection of Claims 11 and 13 under 35 U.S.C. § 103(a) as being unpatentable over Becker and Zhou and further in view of Sato US 6,812,470, hereafter "Sato."

The foregoing remarks of Section 1 are incorporated herein by reference. Sato fails to rectify the deficiencies of Becker as modified by Zhou with respect to independent claim 1. Since claims 11 and 13 depend from claim 1, they necessarily incorporate all of the limitations of claim 1 and are likewise nonobvious with regard to the cited combination of Becker and Zhou.

Reconsideration and removal of the rejection is respectfully requested.

6. Rejection of Claim 14 under 35 U.S.C. § 103(a) as being unpatentable over Becker and Zhou and further in view of Wu and further in view of Goswami.

The foregoing remarks of Section 1 are incorporated herein by reference. Wu and Goswami fail to rectify the deficiencies of Becker as modified by Zhou with respect to independent claim 1. Since claim 14 depends from claim 1, it necessarily incorporates all of the limitations of claim 1 and is likewise nonobvious with regard to the cited combination of Becker and Zhou.

Reconsideration and removal of the rejection is respectfully requested.

7. Rejection of Claim 15 under 35 U.S.C. § 103(a) as being unpatentable over Becker and Zhou and further in view of Wu and further in view of Sherman US 6,653,356.

The foregoing remarks of Section 1 are incorporated herein by reference. Wu and Sherman fail to rectify the deficiencies of Becker as modified by Zhou with respect to independent claim 1. Since claim 15 depends from claim 1, it necessarily incorporates all of the limitations of claim 1 and is likewise nonobvious with regard to the cited combination of Becker and Zhou.

Reconsideration and removal of the rejection is respectfully requested.

8. Rejection of Claims 16 and 17 under 35 U.S.C. § 103(a) as being unpatentable over Becker and Zhou and further in view of Wu and further in view of Wei et al. (US 2005/0129591).

The foregoing remarks of Section 1 are incorporated herein by reference. Wu and Wei fail to rectify the deficiencies of Becker as modified by Zhou with respect to independent claim 1. Since claims 16 and 17 depend from claim 1, they necessarily incorporate all of the limitations of claim 1 and are likewise nonobvious with regard to the cited combination of Becker and Zhou.

Reconsideration and removal of the rejection is respectfully requested.

9. Rejection of Claims 18-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Becker and Zhou and further in view of Sigai US 4,585,673.

The foregoing remarks of Section 1 are incorporated herein by reference. Sigai fails to rectify the deficiencies of Becker as modified by Zhou with respect to independent claim 1. Since claims 18-20 depend from claim 1, they necessarily incorporate all of the limitations of claim 1 and are likewise nonobvious with regard to the cited combination of Becker and Zhou.

Reconsideration and removal of the rejection is respectfully requested.

10. New Claims 25-34

Notwithstanding the foregoing, Applicants note the following with regard to new claims 25-34.

Independent Claim 25 has been added without reciting new matter, as support for Claim 25 can be found in paragraphs [0043]-[0045], [0049]-[0051] and [0054] of Applicants' specification. None of the cited art, whether taken individually or in any permissible combination, discloses or even suggests the control device being configured to alternate the backpressure pulse of gaseous material from the second input with the entrance of contaminated gas or fluidizing material from the first and fluidizing inputs, respectively. Accordingly, Applicants respectfully submit that Claim 25 is allowable.

Claims 26-34 depend from Claim 25 and therefore necessarily incorporate all of the limitations thereof. As a result, it is submitted that these dependent claims are likewise allowable for the same reasons discussed above.

Claim 26 has been added without reciting new matter, as support for Claim 26 can be found in paragraph [0054] of Applicants' specification. Applicants respectfully submit that none of the cited art discloses or even suggests the control device being configured to introduce the backpressure pulse of gaseous material for about 0.2 seconds and being further configured to introduce the contaminated gas or the fluidizing material in the hollow interior region for about 0.8 seconds. For this additional reason, it is submitted that Claim 26 is allowable.

Claim 27 has been added without reciting new matter, as support for Claim 27 can be found in paragraph [0054] of Applicants' specification. It is submitted that none of the art of record discloses or suggests the control device comprising at least one of a needle valve, a solenoid, a computer, a generator and a sensor. Therefore, allowance of Claim 27 is respectfully requested for this additional reason.

Claim 28 has been added without reciting new matter, as support for Claim 28 can be found in paragraph [0037], [0039], [0054] and [0055] of Applicants' specification. None of the cited art, whether taken individually or in any permissible combination, discloses or even suggests the control device being configured to introduce the back pressure pulse at a force based on a volume of the hollow interior region, a density of the contaminated gas, a concentration of the contaminated gas, a composition of the contaminated gas, a composition of the plurality of catalyst nanoparticles, an internal pressure of a contaminated gas source, a temperature of a contaminated gas source, a particle build up in the chamber of the fluidized-bed reactor or any combination thereof. It is therefore respectfully submitted that Claim 28 is allowable for this additional reason.

Claim 29 has been added without reciting new matter, as support for Claim 29 can be found in paragraph [0029] of Applicants' specification. It is submitted that none of the cited art discloses or even suggests the fluidizing input being disposed 45 degrees relative to the gas permeable layer and having an outlet directed at the plurality of catalyst nanoparticles on the gas permeable layer. For this additional reason, it is submitted that Claim 29 is allowable.

Claim 30 has been added without reciting new matter, as support for Claim 30 can be found in paragraph [0049] of Applicants' specification. None of the art of record, whether taken individually or in any permissible combination, discloses or even suggests the decontaminated gas passage way being configured to receive the decontaminated gas exiting from the hollow interior region through the port and the gas permeable separation device. Furthermore, none of the cited art discloses or suggests the decontaminated gas passage way being further configured to recycle the decontaminated gas through at least one of the fluidizing inlet and the port into the hollow interior region. Accordingly, for this additional reason, Applicants submits that Claim 30 is allowable.

Claims 31 and 32 have been added without reciting new matter, as support for Claims 31 and 32 can be found in paragraph [0052] and [0055] of Applicants' specification. Since claims 31 and 32 depend from Claim 30, it necessarily incorporates all of the limitations thereof. As a result, it is submitted that Claims 31 and 32 are likewise allowable for the reasons discussed above. Regarding Claim 31, none of the cited art discloses or even suggests flame ionization detector in communication between the decontaminated gas passage way and the fluidizing input, such that the decontaminated gas passes through the flame ionization detector to the fluidizing input. With respect to Claim 32, none of the cited art discloses the filtration device being configured to collect the plurality of catalyst nanoparticles that bypasses the gas permeable separation device from the hollow interior region, and the gauge configured to generate a signal indicative of a quantity of catalyst nanoparticles that bypasses the gas permeable separation device, with the signal being received by another control device. For these additional reasons, it is submitted that Claims 31 and 32 are allowable.

Claim 33 has been added without reciting new matter, as support for Claim 33 can be found in paragraph [0055] of Applicants' specification.

Claim 34 has been added without reciting new matter, as support for Claim 34 can be found in paragraph [0050] and [0052] of Applicants' specification.

CONCLUSION

Applicants respectfully submit that the Application and pending claims are patentable in view of the foregoing amendments and/or remarks. A Notice of Allowance is respectfully requested. As always, the Examiner is encouraged to contact the Undersigned by telephone if direct conversation would be helpful.

Respectfully Submitted,

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